REMARKS

Claims 1-8 are pending in the above-identified application. Claim 1 has been corrected in order to remove the issue regarding the claim objection addressed below. Support for the substantive insertion into claim 1 is found at page 3, lines 6-10 and page 7, line 23 to page 9, line 23 of the specification. Claim 6 has been amended to be consistent with claim 1. Claim 8 has been amended so as to remove typographical errors.

Removal of Basis for Claim Objection

Claim 1 has been objected to because of the incorrect use of superscript numbers regarding an optional embodiment of the variable "X". Claim 1 has been corrected, such that this objection should now be withdrawn.

Issues under 35 USC 102(b)

Claims 1, 4 and 5 have been rejected under 35 USC 102(b) as being anticipated by Westrenen et al. (Recl. Trav. Chim. Pays-Bas, 109, 1990, pp. 474-478). This rejection is traversed based on the following.

Westrenen et al. discloses the synthesis of polyhydroxycarboxylates and describes N-(2,3-dihydroxypropyl)aspartate at page 477 as Compound **4b**. Westrenen also mentions other amino acids including glycine and serine at page 476, second column.

Westrenen et al. fails to disclose or suggest the subject matter of the presently pending claims, including claim 1. In this regard, note that substiutent "Y" in formula (I) in claim 1 has been amended so as to now encompass a side chain of a "basic" or "neutral" α-amino acid, as opposed to an "acidic" α-amino acid. Therefore, the N-(2,3-dihydroxypropyl)aspartate compound described by Westrenen et al. has been excluded from the present claims such that this reference fails to support an allegation of anticipation against any of the pending claims.

As a further clarification regarding Westrenen et al., it is noted that the disclosure of glycine and serine is made with respect to the N-alkylation of these amino acids with maleate, which does not produce an N-glyceryl derivative of glycine or serine. Rather, this reaction produces totally different compounds as is evident from a review of the glycine and serine derivative Compounds **4f** and **4g** described in the first column at page 478 of Westrenen et al. Thus, a proper interpretation of Westrenen et al. fails to provide any disclosure or suggestion regarding the subject matter of the present claims. In addition, it is also noted that the N-(2,3-dihydroxypropyl)aspartate compound described in Westrenen et al. is produced from the starting material 1-amino-2,3-propanediol, not from aspartic acid. The product of the reaction between 1-amino-2,3-propanediol and maleic acid incidentally turns out to correspond to an "N-glyceryl" derivative of an aspartic acid salt; but this does not change the fact that none of the compounds within the present claims are disclosed or suggested by Westrenen et al. Consequently, significant patentable distinctions exist over Westrenen et al. such that the rejections based on this reference must be withdrawn.

Issues under 35 USC 103(a)

Claims 2 and 6 have been rejected under 35 USC 103(a) as being unpatentable over Westrenen et al. in view of Tamura '936 (USP 5,858,936).

Claims 7 and 8 have been rejected under 35 USC 103(a) as being unpatentable over Westrenen et al. in view of Tamura '936 and further in view of Hamada '284 (USP 5,856,284).

Claim 3 is rejected under 35 USC 103(a) as being unpatentable over Westrenen et al. in view of Matsunaga '567 (USP 3,843,567).

All of the above-noted rejections are traversed based on the following reasons.

Distinctions over Cited References

First, as discussed in detail above, Westrenen et al. indeed fails to disclose any compounds falling within the scope of claim 1 or any of the other pending claims of the present application. In order to further establish that Westrenen et al. fails to provide any adequate basis for a motivation to one skilled in the art to modify the compounds described therein in order to arrive at the presently claimed compounds, Applicant hereby submits: [1] Exhibit A (Wilham et al., Journal of the American Oil Chemists' Society, vol. 48, 1971, pp 682-683); and [2] Exhibit B (a "Compound List" showing the structures of relevant compounds).

Regarding Exhibit A, Table II at p 682, right column, discloses the "calcium sequestering capacity" at pH 10°C and 25°C for nine compounds. This is a measure of the "chelating" properties of these compounds. As shown in Exhibit B, STPP, NTA, polyitaconate, and citrate, have three or more carboxyl or phosphate groups, while diglycolate and D-glucarate have two carboxyl groups, and glycolate, D-gluconate and D-glucoheptonate each have only one carboxyl group. It is apparent from Table II that compounds having one carboxyl group, i.e. glycolate, D-gluconate and D-glucoheptonate, exhibit poor chelating properties. On the other hand, STPP, NTA, polyitaconate, and citrate exhibit very good chelating properties. These results in Table II strongly suggest that the number of carboxyl (or phosphate) groups present in a molecule significantly affects chelating properties.

In this regard, it is noted that while N-glyceryl derivatives of an acidic α-amino acid have two (or more) carboxyl groups, N-glyceryl derivatives of a basic or neutral α-amino acid have only one carboxyl group. Therefore, one of ordinary skill would not have been motivated to use N-glyceryl derivatives of the present invention which are formed from basic or neutral α-amino acids as a chelating agent, as opposed to derivatives formed from acidic α–amino acids which would be expected to exhibit much better chelating properties and which are excluded from the present claims.

Further, it is noted that the N-glyceryl derivatives of basic α-amino acids encompassed by the present invention exhibit advantageous properties with respect to uses on hair and with respect to improvement of skin damage, as compared to N-glyceryl derivatives of acidic α-amino acids, as mentioned in the present specification at page 9, lines 4-7. None of the cited references recognize these advantageous properties.

Consequently, in view of the above, not only does Westrenen et al. fail to disclose or suggest any compounds within the scope of the present claims, but this reference additionally fails to provide any adequate basis for motivation to one skilled in the art to attempt to obtain any of the compounds of the present claims.

Tamura '936 discloses detergent compositions which include a compound (D) that is a metal chelating agent. As noted at column 6, lines 21-36, this agent may be an "amino acid chelating agent".

Hamada '284 discloses detergent compositions which include component (C) which may be an "N-acyl amino acid" as noted at column 3, lines 48-59.

Both Tamura '936 and Hamada '284 fail to disclose or suggest any of the compounds of the present claims. As noted above, Westrenen et al. fails to disclose any compounds within the scope of the present invention as well. Thus, an attempt to combine Westrenen et al. with either of these references fails to result in any of the presently claimed compounds. Further still, Westrenen et al. fails to provide any basis for attempting to employ the metal chelating agent of Tamura '936 or the surfactant of Hamada '294 in an attempt to obtain the compounds of the present invention. Consequently, significant patentable distinctions exist between the present invention and all of these references, whether taken separately or hypothetically combined.

The Examiner indicates that Matsunaga '567 discloses a chelating amino acid addition polymer, which is produced through a Michael-type addition of an amino acid, such as glycine, aspartic acid, lysine, ornithine, threonine, serine and arginine (page 10 lines 8-12 in the office

action). The Examiner also mentions that one of ordinary skill would have been motivated to utilize the amino acids in Matsunaga '567 for synthesis of chelating agents, because Westrenen et al. discloses the synthesis of chelating agents via Michael-type addition and Matsunaga '567 discloses that amino acids (such as lysine, ornithine) are suitable to reacting in Michael-type addition.

Matsunaga '567 fails to disclose or suggest any of the compounds recited in the present claims. Further, even though lysine, ornithine, etc. may be suitable for reacting in a Michael-type addition, as mentioned in Matsunaga '567, the Michael-type addition of such α-amino acids does not produce N-glyceryl derivatives of formula (I) in the present claims, but rather produces other compounds which have completely different structures. For example, the following formula shows a Michael-type addition of glycine with an acryloyl compound containing at least two acryloyl groups: CH_2=$CHCONH)_2CH_2$ + $2NH_2CH_2COOH$ ⟶ $ZCH_2CH_2CONHCH_2NHCOCH_2CH_2Z$

wherein Z = -$NHCH_2COOH$. The product is not an N-glyceryl derivative of formula (I) of the present claims..

Matsunaga '567 discloses only Michael-type additions of α-amino acids with an acryloyl compound containing at least two acryloyl groups, and this does not produce N-glyceryl derivative of the present invention. In addition, Matsunaga '567 does not disclose or suggest any reactions between α-amino acids and glycidol or 3-halo-1,2-propanediol. Therefore, significant patentable distinctions exist over Matsunaga '567, such that the rejection based on this reference must be withdrawn. Even if Matsunaga '567 is hypothetically combined with Westrenen et al. the resulting combined disclosure would fail to disclose or suggest the compounds of the present invention.

It is submitted for the reasons above that the present claims define patentable subject matter such that this application should now be placed in condition for allowance.

If any questions arise in the above matters, please contact Applicant's representative, Andrew D. Meikle (Reg. No. 32,868), in the Washington Metropolitan Area at the phone number listed below.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37 C.F.R. §§ 1.16 or 1.17; particularly, extension of time fees.

Dated: June 30, 2008

Respectfully submitted,

By _____

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Enclosures: Exhibit A
Exhibit B

Exhibit A
10/537,606
4244-0106PUS1

Organic Acids as Builders in Linear Alkylbenzene Sulfonate Detergent Formulations

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Abstract

Sodium salts of citric, glycolic, diglycolic and three sugar acids, directly derived from D-glucose, were evaluated as builders in a formulation for a linear alkylbenzene sulfonate detergent. Only sodium citrate and diglycolate were at least 60% as effective as sodium tripolyphosphate in building action in hard water. Detergency appeared to be related to calcium sequestration by the salts at pH 10.

Introduction

In a previous investigation (1) we evaluated several carboxylated starch derivatives as replacement builders for sodium tripolyphosphate (STPP) in a standard formulation for a linear alkylbenzene sulfonate (LAS) detergent. We have extended our studies to determine the building efficiency of several acids, derived directly from D-glucose, which are known to have metal ion sequestering properties in 2–4% alkali (2). These are D-gluconic, D-glucoheptonic and D-glucaric (3) acids. Citric, glycolic and diglycolic acids were also evaluated for their building effect in hard water. Besides STPP, both nitrilotriacetic (NTA) and polyitaconic acids (4,5) are known to have good building action with LAS detergents and were used to confirm the adequacy of the detergency test procedure. The sodium salts of the acids were incorporated in the detergent formulations on a 50% weight basis.

Experimental Procedures

Materials

STPP, NTA, sodium citrate, sodium D-glucoheptonate, sodium D-gluconate, glycolic and diglycolic acids were commercial products. Polyitaconic acid ("Polycon B") was obtained from Pfizer, Inc., Brooklyn, New York. Potassium acid D-glucarate was prepared by nitric acid oxidation of D-glucose (3).

Standard detergent was Conoco SA-697, a 97% active linear tridecyl-benzene sulfonic acid produced by Continental Oil Company, New York. FDS standard soiled cotton was purchased from Foster D. Snell, Inc., subsidiary of Booz-Allen Applied Research, Inc., Florham Park, New Jersey.

Detergency

The basic detergent formulation contained 15% Conoco SA-697 (neutralized with sodium hydroxide), 50% STPP, 24% sodium sulfate, 10% sodium metasilicate and 1% carboxymethyl cellulose. In the experimental formulations, the 50% STPP was replaced by 50% organic acid salts. Detergency was measured as the average increase in reflectance, ΔR, after washing six swatches of standard soiled cotton in a Terg-O-Tometer for 20 min at 60 C and 105 cycles/min. Relative detergency was calculated from the ratio of ΔR for the experimental formulation and ΔR for the STPP standard formulation.

TABLE I

Detergent Building Efficiency[a] in Hard Water

Compound[b]	Hardness: 150 ppm		Hardness: 300 ppm	
	ΔR[c]	$\frac{\Delta R}{\Delta R, STPP}\times 100$ [d]	ΔR	$\frac{\Delta R}{\Delta R, STPP}\times 100$
STPP	27.2[e]	100	17.5[e]	100
NTA	25.3	93	24.3	139
Polyitaconate	22.1	80	25.0	143
Citrate	17	63	10.6	61
D-Gluconate	5.6	21	4.6	26
D-Glucoheptonate	5.6	21	4.3	25
D-Glucarate[f]	5.5	21	5.6	31
Glycolate	6.7	25	9.6	55
Diglycolate	17.2	63	12.5	72

[a] Total detergent concentration 0.15% (0.023% active detergent, 0.075% builder; exclusive of sodium sulfate, sodium metasilicate and carboxymethyl cellulose).
[b] Sodium salt was 50 wt % of total detergent solids.
[c] The least significant differences in ΔR at 95% probability are comparable to those reported previously (1).
[d] Abbreviations: STPP, sodium tripolyphosphate; NTA, nitrilotriacetic acid (trisodium salt).
[e] Reflectance with STPP as 100%.
[f] Potassium sodium D-glucarate.

Calcium Sequestering Capacity

Chelation of calcium ions by the various compounds investigated as builders was determined at pH 10 and 25 C (±1°) as follows: 1.0 g of the sodium salt of the builder was dissolved in 50 ml of distilled water in a 150 ml beaker by magnetic stirring and adjusted to pH 10 with sodium hydroxide solution. Then 3 ml of 2% sodium oxalate solution was added, and the solution titrated with 1% calcium acetate solution to slight turbidity. Each milliliter of 1% calcium acetate is equivalent to 6.32 mg of $CaCO_3$ sequestered.

Results and Discussion

Table I shows the building efficiency of the various compounds investigated as additives in an LAS detergent formulation in water having 150 ppm or 300 ppm of hardness.

Building efficiency was poor with the sodium salts of D-gluconic, D-glucoheptonic, D-glucaric and glycolic acids. Although the sugar acids are good sequestrants for calcium ions in 2–4% sodium hy-

TABLE II

Calcium Sequestering Capacity at pH 10 and 25 C

Compound[a]	mg $CaCO_3$/g of compound
STPP[b]	341
NTA	321
Polyitaconate	461
Citrate	94
Glycolate	19
Diglycolate	206
D-Gluconate	8
D-Glucoheptonate	6
D-Glucarate[c]	26

[a] Sodium salts.
[b] Abbreviations: see Table I.
[c] Potassium sodium D-glucarate.

[1] No. Utiliz. Res. Dev. Div., ARS, USDA.

droxide solutions (2), they do not have much chelating effect at pH 10 and 25 C (Table II). Sodium citrate and sodium diglycolate performed somewhat better in building action and calcium sequestration at pH 10 but were only 61% and 72% as effective, respectively, as builders compared to STPP in 300 ppm of hard water. The high building efficiency of both NTA and polyitaconate are also shown in Table I for comparison with the other sodium salts and to confirm the adequacy of the detergency test method. These salts appear to be much better builders at the higher hardness level. The good calcium sequestering properties of STPP, NTA and polyitaconate (Table II) reflect the importance of calcium chelation at pH 10 for good building action.

REFERENCES

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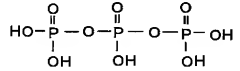
2. Mehlretter, C.L., B.H. Alexander and C.E. Rist, Ind. Eng. Chem. 45: 2782–2784 (1953).
3. Mehlretter, C.L., and C.E. Rist, J. Agr. Food Chem. 1: 779–783 (1953).
4. Diehl, F.L. (The Procter and Gamble Co.), U.S. Patent 3,308,067 (1967).
5. Carter, E.P., Jr., and R.R. Irani (Monsanto Co.), U.S. Patent 3,468,794 (1969).

[Received January 11, 1971]

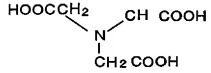
Compound List

(1) STPP (Sodium tripolyphosphate)

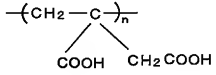


Group "-OH" may be "-ONa" in a commercially avalable STPP.

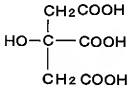
(2) NTA (Nitrilotriacetic acid)



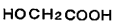
(3) Polyitaconate



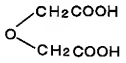
(4) Citrate



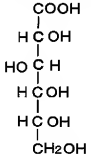
(5) Glycolate



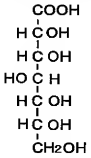
(6) Diglycolate



(7) D-Gluconate



(8) D-Glucoheptonate



(9) D-Glucarate